

WHAT IS CLAIMED AS NEW AND DESIRED TO BE SECURED BY LETTERS
PATENT OF THE UNITED STATES IS:

1. An image recording method comprising:
applying a pretreatment liquid on a surface of a recording
5 material; and

discharging a recording ink according to image signals
to form an ink image on the pretreatment liquid on the surface
of the recording material before the pretreatment liquid
applied on the recording material has dried, wherein the
10 recording ink comprises a solvent and a component dispersed or
dissolved in the solvent,

wherein the pretreatment liquid comprises a compound
depressing at least one of the dispersibility and solubility
of the component in the recording ink in an amount of 10 to 80 %
15 by weight based on total weight, and

wherein the pretreatment liquid has a viscosity of from
10 to 10,000 mPa · s at 25 °C.

2. The image recording method according to Claim 1,
20 wherein the component in the recording ink is a colorant.

3. The image recording method according to Claim 1,
wherein the pretreatment liquid has a viscosity of from 20 to
10,000 mPa · s at 25 °C.

25 4. The image recording method according to Claim 1,
wherein the pretreatment liquid is applied on the surface of

the recording material in an amount of from 0.5 g/m² to 10 g/m².

5 5. The image recording method according to Claim 1,
wherein the recording ink has a contact angle not greater than
90° against the surface of the recording material on which the
pretreatment liquid is applied.

10 6. The image recording method according to Claim 1,
wherein the pretreatment liquid has a surface tension of from
40 mN/m to 60 mN/m and the recording ink has a surface tension
of from 20 mN/m to 40 mN/m.

15 7. The image recording method according to Claim 1,
wherein the pretreatment liquid is applied on areas of the
recording material on which the ink image is and is not formed.

20 8. The image recording method according to Claim 1,
wherein the pretreatment liquid application is performed with
a contact applicator.

9. The image recording method according to Claim 8,
wherein the contact applicator comprises a roller.

25 10. The image recording method according to Claim 1,
further comprising:

heating the ink image formed on the pretreatment liquid
on the recording material before the pretreatment liquid dries.

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11. The image recording method according to Claim 1,
wherein the recording material comprises pulp fibers, and
5 wherein the recording material has a sizing degree not less than
10 s and an air permeability of from 5 s to 50 s.

12. The image recording method according to Claim 1,
wherein the component in the recording ink is an anionic
10 material.

13. The image recording method according to Claim 12,
wherein the anionic material is selected from the group
consisting of anionic dyes, pigments dispersed by an anionic
15 dispersant, dyes dispersed by an anionic dispersant, pigments
modified by an anionic group, and anionic color particles.

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see claims 2 & 26
14. A pretreatment liquid, comprising a compound in an
amount of 10 to 80 % by weight based on total weight that
20 depresses at least one of the dispersibility and solubility of
a component in a recording ink, wherein the pretreatment liquid
has a viscosity of from 10 to 10,000 mPa · s at 25 °C.

15. The pretreatment liquid according to Claim 14, wherein
25 the component in the recording ink is a colorant.

16. The pretreatment liquid according to Claim 14, wherein

the viscosity of the pretreatment liquid is from 20 to 10,000 mPa · s at 25 °C.

17. The pretreatment liquid according to Claim 14, further
5 comprising water in an amount of from 5 % to 80 % by weight based on total weight of the pretreatment liquid.

18. The pretreatment liquid according to Claim 14, further
10 comprising water and a water-soluble liquid compound, wherein water and the water-soluble liquid compound are included in an amount of from 20 % to 80 % by weight based on total weight of the pretreatment liquid.

19. The pretreatment liquid according to Claim 18, wherein
15 water is included in the pretreatment liquid in an amount not greater than 40 % by weight based on total weight of the pretreatment liquid.

20. The pretreatment liquid according to Claim 19, wherein
20 the content of water is not greater than an equilibrium water content of the water-soluble liquid compound at 60 %RH.

21. The pretreatment liquid according to Claim 14, further
comprising a water-soluble organic solvent in an amount of from
25 5 to 70 % by weight based on total weight of the pretreatment liquid.

22. The pretreatment liquid according to Claim 14, wherein the compound depressing at least one of the dispersibility and solubility of the component in the recording ink is an ionic compound.

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23. The pretreatment liquid according to Claim 22, wherein the ionic compound is an ionic compound having an alkyl group having not less than 6 carbon atoms.

10 24. The pretreatment liquid according to Claim 22, wherein the ionic compound is an ionic polymer.

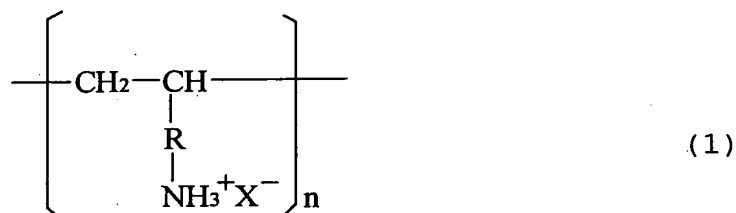
15 25. The pretreatment liquid according to Claim 22, wherein the ionic compound is a cationic compound. *See also claim 31*

26. The pretreatment liquid according to Claim 25, wherein the cationic compound is a cationic polymer.

20 27. The pretreatment liquid according to Claim 26, wherein the cationic polymer has a cationic degree not less than 3.0 meq/g.

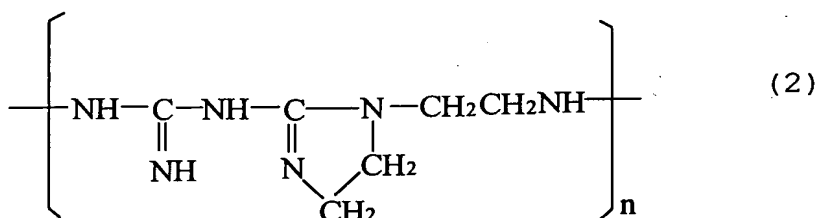
25 28. The pretreatment liquid according to Claim 26, wherein the cationic polymer has or includes a formula selected from the group consisting of the following formulae (1) to (18):

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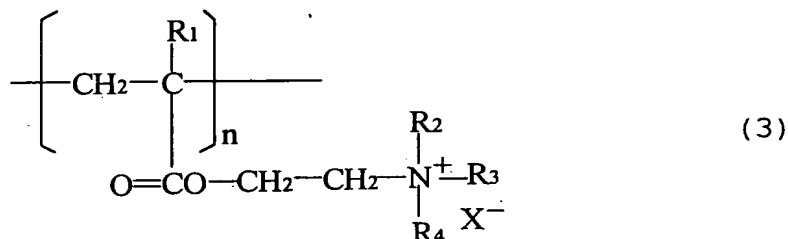
wherein X^- represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; R represents an alkylene group having from 1 to 3 carbon atoms; and n is an integer;

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wherein n is an integer;

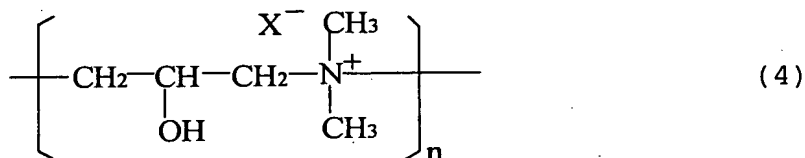
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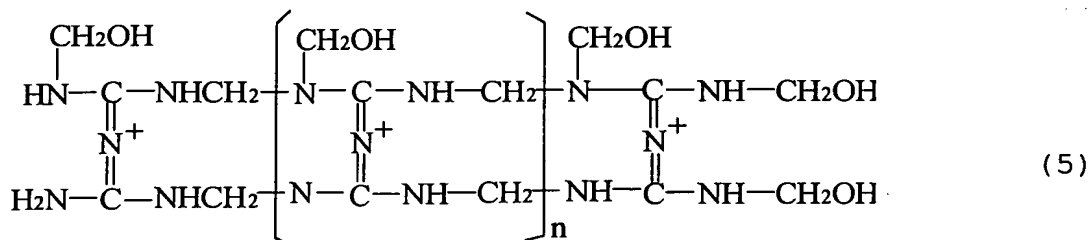
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wherein X^- represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; R_1 represents a hydrogen atom or a methyl group; R_2 , R_3 and R_4 independently represent a hydrogen atom or an alkyl group; and n is an integer;

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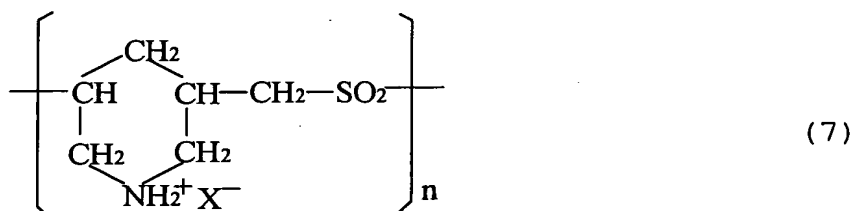
wherein X^- represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and n is an integer;



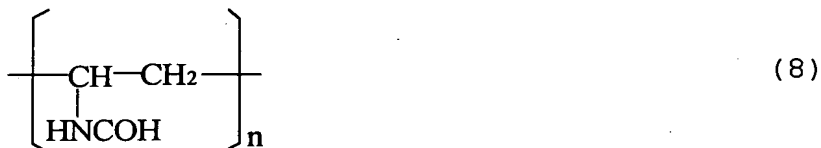
wherein n is an integer of from 5 to 30;



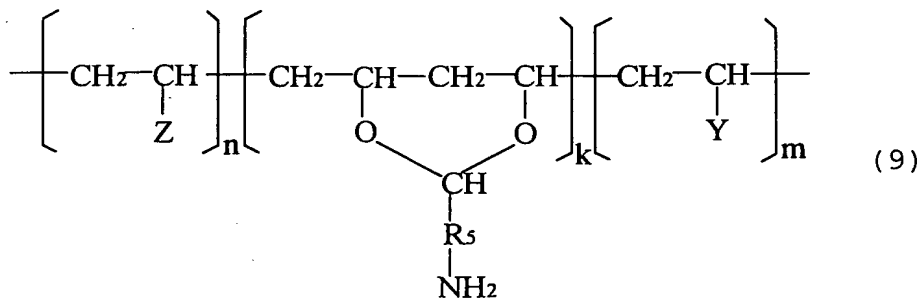
wherein n is an integer;



wherein X^- represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and n is an integer;

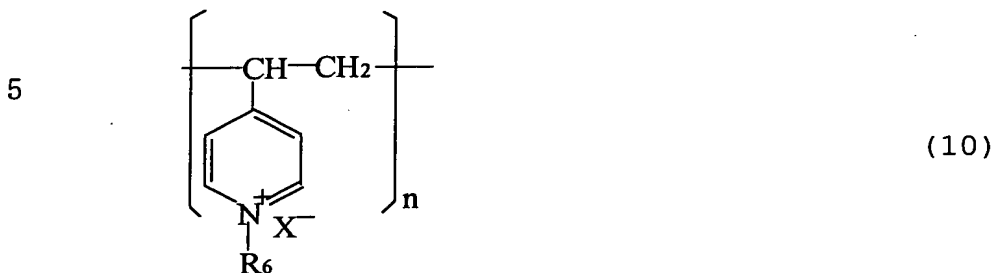


wherein n is an integer;

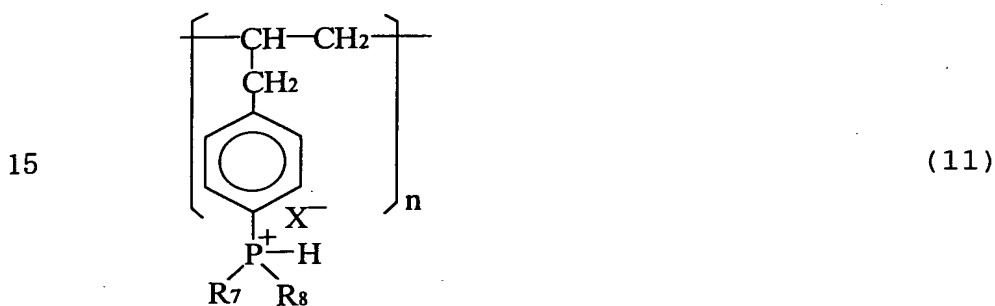


wherein Z and Y independently represent $-\text{OCOCH}_3$ or $-\text{OH}$; R_5

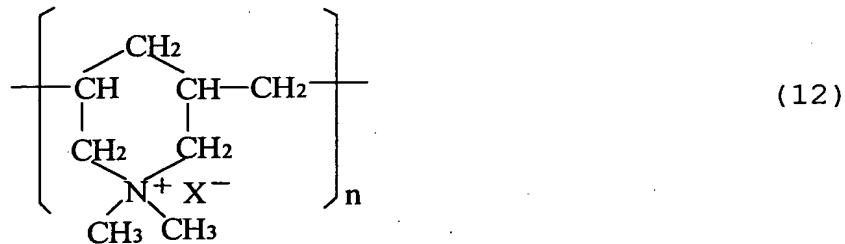
represents an alkylene group having from 1 to 4 carbon atoms;
and n, k and m independently are integers;



wherein R₆ represents an alkyl group; X⁻ represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and n is an integer;

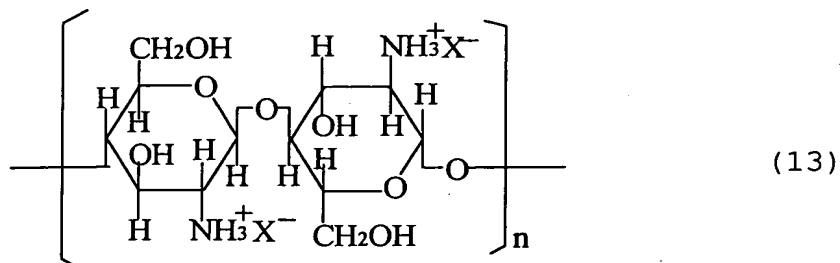


wherein R₇ and R₈ independently represent a hydrogen atom or an alkyl group; X⁻ represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and n is an integer;



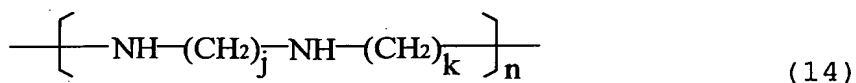
wherein X⁻ represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and n is an integer;

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wherein X^- represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and n is an integer;

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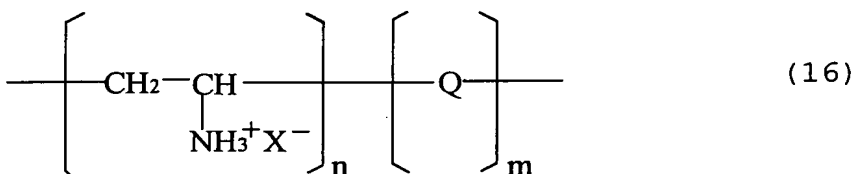
wherein j and k are independently an integer of from 2 to 6; and n is an integer;

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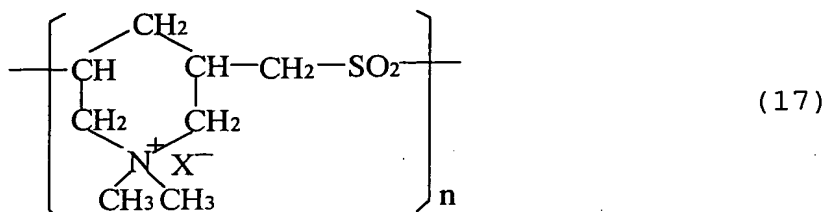
wherein X^- represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and n is an integer;

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wherein X^- represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; Q represents another repeating unit; and n and m are independently an integer;

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wherein X^- represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and n is an integer; and



wherein X^- represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and n is an integer.

29. The pretreatment liquid according to Claim 26, wherein the cationic polymer is a cationic polymer comprising at least one of repeating units having the following formulae (19) and (20):



wherein D_1 represents a substituent having one of the following formulae (21) and (22); D_2 represents a hydrogen atom or a substituent having one of the following formulae (21) and (22); n and m are independently an integer,



wherein R_9 and R_{10} independently represent a hydrogen atom, an alkyl group having from 1 to 12 carbon atoms or an allyl group;

R₁₁ and R₁₂ independently represent a hydrogen atom, an alkali metal or a substituent having the following formula (23):



wherein R₁₃ to R₁₆ independently represent a hydrogen atom, an alkyl group, an allyl group, a hydroxyalkyl group or a benzyl group.

30. The pretreatment liquid according to Claim 25, wherein the cationic compound is dispersed in the pretreatment liquid.

31. The pretreatment liquid according to Claim 30, wherein the cationic compound is a cationic silica.

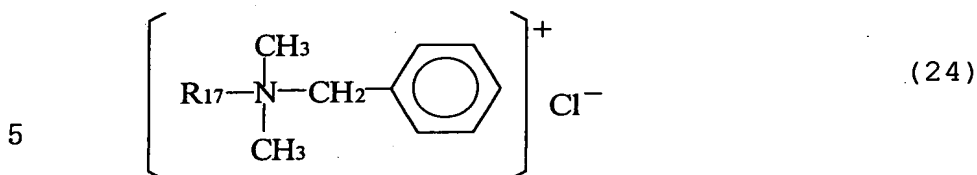
32. The pretreatment liquid according to Claim 30, wherein the cationic compound is emulsified in the pretreatment liquid.

33. The pretreatment liquid according to Claim 14, wherein the compound that depresses at least one of the dispersibility and solubility of the component in the recording ink is a water-soluble polyvalent metal salt.

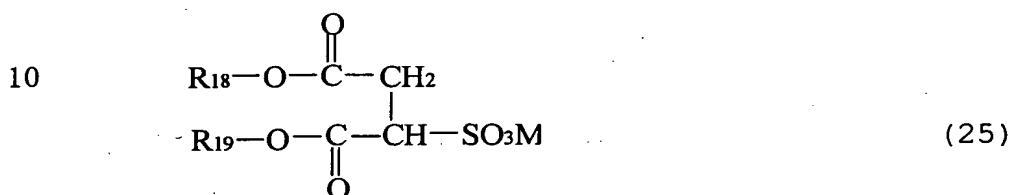
34. The pretreatment liquid according to Claim 14, further comprising at least one of a surfactant and a wetting accelerator, wherein the pretreatment liquid has a surface tension not greater than 40 mN/m.

35. The pretreatment liquid according to Claim 34, wherein

the surfactant has a formula selected from the group consisting of the following formulae (24) to (29):



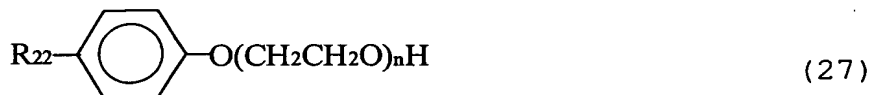
wherein R₁₇ represents a lauryl group, a stearyl group or a myristyl group;



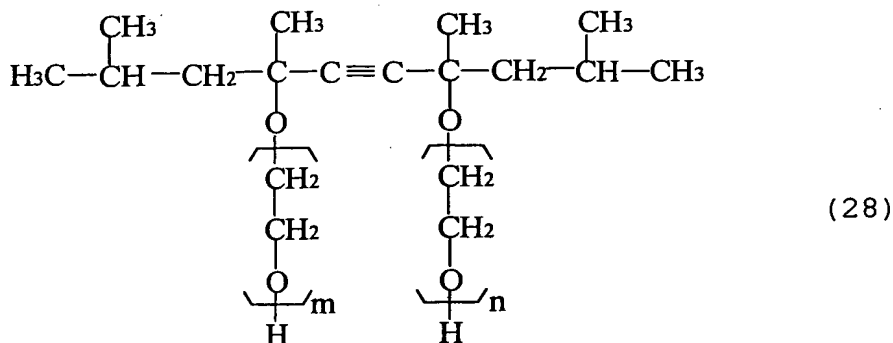
15 wherein R₁₈ and R₁₉ independently represent an alkyl group having not less than 3 carbon atoms which may be branched; M represents an alkali metal, an ammonium group, an alkanol amine group, a quaternary ammonium group or a quaternary phosphonium group;



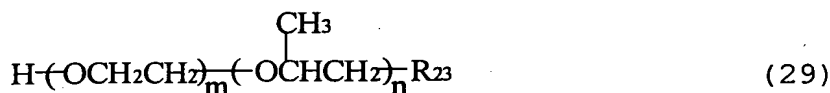
20 wherein R₂₀ and R₂₁ independently represent an alkyl group having from 5 to 7 carbon atoms; and m is an integer of from 5 to 20;



25 wherein R₂₂ represents a carbon chain having from 6 to 14 carbon atoms which may be branched; and n is an integer of from 5 to 20;



wherein m and n are independently 0 or an integer of from 1 to 20; and



wherein R₂₃ represents a carbon chain having from 6 to 14 carbon atoms which may be branched; and m and n are independently 0 or an integer of from 1 to 20.

36. The pretreatment liquid according to Claim 34, including a surfactant, wherein the surfactant is included in the pretreatment liquid in an amount of from 0.1 to 10 % by weight.

37. The pretreatment liquid according to Claim 14, further comprises at least one of an antiseptic agent or antimildew agent in an amount of from 0.1 to 5 % by weight based on total weight of the pretreatment liquid.

38. An image recording method comprising:
 discharging a recording ink according to image signals to form an ink image on a surface of the recording material on

which a pretreatment liquid is applied and has dried, wherein the recording ink comprises a solvent and a component dispersed or dissolved in the solvent,

wherein the pretreatment liquid comprises a compound
5 depressing at least one of the dispersibility and solubility of the component in the recording ink in an amount of 10 to 80 % by weight based on total weight, and

wherein the pretreatment liquid has a viscosity of from 10 to 10,000 mPa · s at 25 °C.

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(39) A recording material having on a surface thereof a dried pretreatment liquid, wherein the pretreatment liquid comprises a compound depressing at least one of the dispersibility and solubility of the component in the recording
15 ink in an amount of 10 to 80 % by weight based on total weight, and wherein the pretreatment liquid has a viscosity of from 10 to 10,000 mPa · s at 25 °C.